

# Biotechnology

This section presents the requirements for programs in:

- **Biochemistry and Biotechnology B.Sc. Honours**
- **Biology and Biotechnology B.Sc. Honours**

## Program Requirements

### Biochemistry and Biotechnology B.Sc. Honours (20.0 credits)

#### A. Credits Included in the Major CGPA (16.0 credits)

|  |  |
|--|--|
| <b>1. 4.0 credits in:</b>                          | <b>4.0</b>   |
| BIOL 1103 [0.5]                                    | Foundations of Biology I                             |
| BIOL 1104 [0.5]                                    | Foundations of Biology II                            |
| BIOL 2104 [0.5]                                    | Introductory Genetics                                |
| BIOL 2301 [0.5]                                    | Biotechnology I                                      |
| BIOL 2303 [0.5]                                    | Microbiology   |
| BIOL 3104 [0.5]                                    | Molecular Genetics                                   |
| BIOL 3301 [0.5]                                    | Biotechnology II                                     |
| BIOL 4301 [0.5]                                    | Current Topics in Biotechnology                      |
| <b>2. 0.5 credit from:</b>                         | <b>0.5</b>   |
| BIOL 2001 [0.5]                                    | Animals: Form and Function                           |
| BIOL 2002 [0.5]                                    | Plants: Form and Function                            |
| <b>3. 0.5 credit from:</b>                         | <b>0.5</b>   |
| BIOL 3201 [0.5]                                    | Cell Biology   |
| BIOL 3205 [0.5]                                    | Plant Biochemistry and Physiology                    |
| BIOL 3303 [0.5]                                    | Experimental Microbiology                            |
| BIOL 3305 [0.5]                                    | Human and Comparative Physiology                     |
| BIOL 4109 [0.5]                                    | Laboratory Techniques in Molecular Genetics          |
| <b>4. 0.5 credit in BIOL 3000-level or higher</b>  | <b>0.5</b>   |
| <b>5. 4.0 credits in:</b>                          | <b>4.0</b>   |
| BIOC 1500 [0.5]                                    | Biochemistry in a Modern Society                     |
| BIOC 2200 [0.5]                                    | Cellular Biochemistry                                |
| BIOC 2500 [0.5]                                    | Research Methods and Skills in Biochemistry          |
| BIOC 2300 [0.5]                                    | Physical Biochemistry                                |
| or CHEM 2103 [0.5]                                 | Physical Chemistry I                                 |
| BIOC 3101 [0.5]                                    | General Biochemistry I                               |
| BIOC 3102 [0.5]                                    | General Biochemistry II                              |
| BIOC 3103 [0.5]                                    | Practical Biochemistry I                             |
| BIOC 3104 [0.5]                                    | Practical Biochemistry II                            |
| <b>6. 1.0 credit in:</b>                           | <b>1.0</b>   |
| BIOC 4907 [1.0]                                    | Honours Essay and Research Proposal                  |
| or BIOC 4908 [1.0]                                 | Research Project                                     |
| <b>7. 1.5 credits in BIOC 2000-level or higher</b> | <b>1.5</b>   |
| <b>8. 3.5 credits in:</b>                          | <b>3.5</b>   |
| CHEM 1001 [0.5]                                    | General Chemistry I                                  |
| &  | General Chemistry II                                 |
| CHEM 1002 [0.5]                                    |  |
| CHEM 2203 [0.5]                                    | Organic Chemistry I                                  |
| &  | Organic Chemistry II                                 |
| CHEM 2204 [0.5]                                    |  |
| CHEM 2303 [0.5]                                    | Analytical Chemistry II                              |
| CHEM 2501 [0.5]                                    | Introduction to Inorganic and Bioinorganic Chemistry |

|  |   |             |
|--|---|-------------|
| CHEM 3201 [0.5]  | Advanced Organic Chemistry I              |             |
| <b>9. 0.5 credit from BIOL or CHEM at the 2000-level or above</b>  |   | <b>0.5</b>  |
| <b>B. Credits Not Included in the Major CGPA (4.0 credits)</b>   |   |             |
| <b>10. 0.5 credit from:</b>  |   | <b>0.5</b>  |
| PHYS 1007 [0.5]  | Elementary University Physics I           |             |
| or PHYS 1003 [0.5]   | Introductory Mechanics and Thermodynamics |             |
| <b>11. 1.0 credit in:</b>  |   | <b>1.0</b>  |
| MATH 1007 [0.5]  | Elementary Calculus I                     |             |
| MATH 1107 [0.5]  | Linear Algebra I                          |             |
| <b>12. 2.0 credits in Approved Courses Outside the Faculties of Science and Engineering and Design (may include NSCI 1000)</b> |   | <b>2.0</b>  |
| <b>13. 0.5 credit in free elective.</b>  |   | <b>0.5</b>  |
| <b>Total Credits</b>   |   | <b>20.0</b> |

### Biology and Biotechnology B.Sc. Honours (20.0 credits)

#### A. Credits Included in the Major CGPA (13 credits)

|                             |   |
|-----------------------------|---|
| <b>1. 6.5 credits in:</b>   | <b>6.5</b>                                |
| BIOL 1103 [0.5]             | Foundations of Biology I                  |
| BIOL 1104 [0.5]             | Foundations of Biology II                 |
| BIOL 1105 [0.5]             | Introduction to Biological Data           |
| BIOL 2001 [0.5]             | Animals: Form and Function                |
| BIOL 2002 [0.5]             | Plants: Form and Function                 |
| BIOL 2104 [0.5]             | Introductory Genetics                     |
| BIOL 2200 [0.5]             | Cellular Biochemistry                     |
| BIOL 2301 [0.5]             | Biotechnology I                           |
| BIOL 2303 [0.5]             | Microbiology                              |
| BIOL 3104 [0.5]             | Molecular Genetics                        |
| BIOL 3201 [0.5]             | Cell Biology                              |
| BIOL 3301 [0.5]             | Biotechnology II                          |
| BIOL 4301 [0.5]             | Current Topics in Biotechnology           |
| <b>2. 1.5 credit in:</b>    | <b>1.5</b>                                |
| BUSI 2800 [0.5]             | Entrepreneurship                          |
| BIOC 3101 [0.5]             | General Biochemistry I                    |
| BIOC 3102 [0.5]             | General Biochemistry II                   |
| <b>3. 4.0 credits from:</b> | <b>4.0</b>                                |
| BIOC 2300 [0.5]             | Physical Biochemistry                     |
| or CHEM 2103 [0.5]          | Physical Chemistry I                      |
| BIOC 3008 [0.5]             | Bioinformatics                            |
| BIOC 3103 [0.5]             | Practical Biochemistry I                  |
| BIOC 3104 [0.5]             | Practical Biochemistry II                 |
| BIOC 3202 [0.5]             | Biophysical Techniques and Applications   |
| BIOL 3004 [0.5]             | Insect Diversity                          |
| BIOL 3102 [0.5]             | Mycology                                  |
| BIOL 3205 [0.5]             | Plant Biochemistry and Physiology         |
| BIOL 3303 [0.5]             | Experimental Microbiology                 |
| BIOL 3305 [0.5]             | Human and Comparative Physiology          |
| BIOL 3501 [0.5]             | Biomechanics                              |
| BIOL 3901 [0.5]             | Research Proposal                         |
| CHEM 3700 [0.5]             | Industrial Applications of Chemistry      |
| CHEM 3800 [0.5]             | The Chemistry of Environmental Pollutants |
| FOOD 3005 [0.5]             | Food Microbiology                         |

|  |  |             |
|--|--|-------------|
| BIOC 4001 [0.5]  | Methods in Biochemistry  |             |
| BIOC 4004 [0.5]  | Industrial Biochemistry  |             |
| BIOC 4005 [0.5]  | Biochemical Regulation   |             |
| BIOC 4007 [0.5]  | Membrane Biochemistry  |             |
| BIOC 4008 [0.5]  | Computational Systems Biology  |             |
| BIOC 4009 [0.5]  | Biochemistry of Disease  |             |
| BIOC 4203 [0.5]  | Secondary Metabolism and Natural Products Biochemistry   |             |
| BIOC 4204 [0.5]  | Protein Biotechnology  |             |
| BIOC 4708 [0.5]  | Principles of Toxicology   |             |
| BIOL 4106 [0.5]  | Advances in Molecular Biology  |             |
| BIOL 4109 [0.5]  | Laboratory Techniques in Molecular Genetics  |             |
| BIOL 4200 [0.5]  | Immunology   |             |
| BIOL 4201 [0.5]  | Advanced Cell Culture and Tissue Engineering   |             |
| BIOL 4202 [0.5]  | Mutagenesis and DNA Repair   |             |
| BIOL 4206 [0.5]  | Human Genetics   |             |
| BIOL 4304 [0.5]  | Forensic Biology   |             |
| BIOL 4901 [0.5]  | Directed Special Studies   |             |
| TSES 4001 [0.5]  | Technology and Society: Risk   |             |
| TSES 4002 [0.5]  | Technology and Society: Forecasting  |             |
| <b>4. 1.0 credit in:</b>                                       |  | <b>1.0</b>  |
| BIOL 4905 [1.0]  | Honours Workshop<br>or BIOL 4907 [1.(Honours Essay and Research Proposal<br>or BIOL 4908 [1.(Honours Research Thesis |             |
| <b>B. Credits Not Included in the Major CGPA (7.0 credits)</b> |  |             |
| <b>5. 2.0 credits in:</b>                                      |  | <b>2.0</b>  |
| CHEM 1001 [0.5]  | General Chemistry I<br>&<br>General Chemistry II   |             |
| CHEM 1002 [0.5]  |  |             |
| CHEM 2203 [0.5]  | Organic Chemistry I<br>&<br>Organic Chemistry II (See Note,<br>below)  |             |
| CHEM 2204 [0.5]  |  |             |
| <b>6. 0.5 credit in:</b>                                       |  | <b>0.5</b>  |
| MATH 1007 [0.5]  | Elementary Calculus I  |             |
| <b>7. 1.5 credits from:</b>                                    |  | <b>1.5</b>  |
| COMP 1005 [0.5]  | Introduction to Computer Science I   |             |
| COMP 1006 [0.5]  | Introduction to Computer Science II  |             |
| MATH 1107 [0.5]  | Linear Algebra I   |             |
| PHYS 1007 [0.5]  | Elementary University Physics I<br>or PHYS 1003 [0.5] Introductory Mechanics and<br>Thermodynamics                   |             |
| PHYS 1008 [0.5]  | Elementary University Physics II<br>or PHYS 1004 [0.5] Introductory Electromagnetism and Wave<br>Motion              |             |
| STAT 2507 [0.5]  | Introduction to Statistical Modeling I   |             |
| <b>8. 2.0 credits in</b>                                       | Approved Courses Outside the Faculties<br>of Science and Engineering and Design (may include<br>NSCI 1000)           | <b>2.0</b>  |
| <b>9. 1.0 credit in</b>  | free electives.  | <b>1.0</b>  |
| <b>Total Credits</b>   |  | <b>20.0</b> |

## B.Sc. Regulations

The regulations presented in this section apply to all Bachelor of Science programs. In addition to the requirements presented here, students must satisfy the University regulations common to all undergraduate

students including the process of Academic Continuation Evaluation (see the *Academic Regulations of the University* section of this Calendar).

### Breadth Requirement for the B.Sc.

Students in a Bachelor of Science program must present the following credits at graduation:

- 2.0 credits in Science Continuation courses not in the major discipline; **students completing a double major are considered to have completed this requirement providing they have 2.0 credits in Science Continuation courses in each of the two majors;**
- 2.0 credits in courses outside of the faculties of Science and Engineering and Design (may include NSCI 1000)

In most cases, the requirements for individual B.Sc. programs, as stated in this Calendar, contain these requirements, explicitly or implicitly.

Students admitted to B.Sc. programs by transfer from another institution must present at graduation (whether taken at Carleton or elsewhere):

- 2.0 credits in courses outside of the faculties of Science and Engineering and Design (may include NSCI 1000) if the student received fewer than 10.0 transfer credits; or,
- 1.0 credit in courses outside of the faculties of Science and Engineering and Design (may include NSCI 1000) if the student received 10.0 or more transfer credits.

### Declared and Undeclared Students

Degree students are considered "Undeclared" if they have been admitted to a degree, but have not yet selected and been accepted into a program within that degree. The status "Undeclared" is available only in the B.A. and B.Sc. degrees. Undeclared students must apply to enter a program upon or before completing 3.5 credits.

### Change of Program within the B.Sc. Degree

To transfer to a program within the B.Sc. degree, applicants must normally be *Eligible to Continue* (EC) in the new program, by meeting the CGPA thresholds described in Section 3.1.9 of the *Academic Regulations of the University*.

Applications to declare or change programs within the B.Sc. degree must be made online through Carleton Central by completing a Change of Program Elements (COPE) application form within the published deadlines. Acceptance into a program, or into a program element or option, is subject to any enrolment limitations, and/or specific program, program element or option requirements as published in the relevant Calendar entry.

### Minors, Concentrations, and Specializations

Students may add a Minor, Concentration, or Specialization by completing a Change of Program Elements (COPE) application form online through Carleton Central. Acceptance into a Minor, Concentration, or Specialization normally requires that the student be *Eligible to Continue* (EC) and is meeting the minimum CGPAs described in Section 3.1.9 of the *Academic*

*Regulations of the University*, as well as being subject to any specific requirements of the intended Minor, Concentration, or Specialization as published in the relevant Calendar entry.

### Experimental Science Requirement

Students in a B.Sc. degree program must present at graduation at least two full credits of Experimental Science chosen from two different departments or institutes from the list below:

#### Approved Experimental Science Courses

##### Biochemistry

|                 |  |
|-----------------|--|
| BIOC 2200 [0.5] | Cellular Biochemistry                        |
| BIOC 4001 [0.5] | Methods in Biochemistry                      |
| BIOC 4201 [0.5] | Advanced Cell Culture and Tissue Engineering |

##### Biology

|                 |                            |
|-----------------|----------------------------|
| BIOL 1103 [0.5] | Foundations of Biology I   |
| BIOL 1104 [0.5] | Foundations of Biology II  |
| BIOL 2001 [0.5] | Animals: Form and Function |
| BIOL 2002 [0.5] | Plants: Form and Function  |
| BIOL 2104 [0.5] | Introductory Genetics      |
| BIOL 2200 [0.5] | Cellular Biochemistry      |
| BIOL 2600 [0.5] | Ecology                    |

##### Chemistry

|                 |   |
|-----------------|---|
| CHEM 1001 [0.5] | General Chemistry I                     |
| CHEM 1002 [0.5] | General Chemistry II                    |
| CHEM 2103 [0.5] | Physical Chemistry I                    |
| CHEM 2203 [0.5] | Organic Chemistry I                     |
| CHEM 2204 [0.5] | Organic Chemistry II                    |
| CHEM 2302 [0.5] | Analytical Chemistry I                  |
| CHEM 2303 [0.5] | Analytical Chemistry II                 |
| CHEM 2800 [0.5] | Foundations for Environmental Chemistry |

##### Earth Sciences

|                 |  |
|-----------------|--|
| ERTH 1006 [0.5] | Exploring Planet Earth                             |
| ERTH 1009 [0.5] | The Earth System Through Time                      |
| ERTH 2102 [0.5] | Mineralogy to Petrology                            |
| ERTH 2404 [0.5] | Engineering Geoscience                             |
| ERTH 2802 [0.5] | Field Geology I                                    |
| ERTH 3111 [0.5] | Vertebrate Evolution: Mammals, Reptiles, and Birds |
| ERTH 3112 [0.5] | Vertebrate Evolution: Fish and Amphibians          |
| ERTH 3204 [0.5] | Mineral Deposits                                   |
| ERTH 3205 [0.5] | Physical Hydrogeology                              |
| ERTH 3806 [0.5] | Structural Geology                                 |

##### Food Sciences

|                 |                   |
|-----------------|-------------------|
| FOOD 3001 [0.5] | Food Chemistry    |
| FOOD 3002 [0.5] | Food Analysis     |
| FOOD 3005 [0.5] | Food Microbiology |

##### Geography

|                 |                              |
|-----------------|------------------------------|
| GEOG 1010 [0.5] | Global Environmental Systems |
| GEOG 3108 [0.5] | Soil Properties              |

##### Neuroscience

|                 |                                |
|-----------------|--------------------------------|
| NEUR 3206 [0.5] | Sensory and Motor Neuroscience |
| NEUR 3207 [0.5] | Systems Neuroscience           |
| NEUR 4600 [0.5] | Advanced Lab in Neuroanatomy   |

##### Physics

|                 |  |
|-----------------|--|
| PHYS 1001 [0.5] | Foundations of Physics I   |
| PHYS 1002 [0.5] | Foundations of Physics II  |
| PHYS 1003 [0.5] | Introductory Mechanics and Thermodynamics                        |
| PHYS 1004 [0.5] | Introductory Electromagnetism and Wave Motion                    |
| PHYS 1007 [0.5] | Elementary University Physics I                                  |
| PHYS 1008 [0.5] | Elementary University Physics II                                 |
| PHYS 2202 [0.5] | Wave Motion and Optics   |
| PHYS 2604 [0.5] | Modern Physics I   |
| PHYS 3007 [0.5] | Third Year Physics Laboratory: Selected Experiments and Seminars |
| PHYS 3606 [0.5] | Modern Physics II  |
| PHYS 3608 [0.5] | Modern Applied Physics   |

### Course Categories for B.Sc. Programs

#### Science Geography Courses

|                 |   |
|-----------------|---|
| GEOG 1010 [0.5] | Global Environmental Systems              |
| GEOG 2006 [0.5] | Introduction to Quantitative Research     |
| GEOG 2013 [0.5] | Weather and Water                         |
| GEOG 2014 [0.5] | The Earth's Surface                       |
| GEOG 3003 [0.5] | Quantitative Geography                    |
| GEOG 3010 [0.5] | Field Methods in Physical Geography       |
| GEOG 3102 [0.5] | Geomorphology                             |
| GEOG 3103 [0.5] | Watershed Hydrology                       |
| GEOG 3104 [0.5] | Principles of Biogeography                |
| GEOG 3105 [0.5] | Climate and Atmospheric Change            |
| GEOG 3106 [0.5] | Aquatic Science and Management            |
| GEOG 3108 [0.5] | Soil Properties                           |
| GEOG 4000 [0.5] | Field Studies                             |
| GEOG 4005 [0.5] | Directed Studies in Geography             |
| GEOG 4013 [0.5] | Cold Region Hydrology                     |
| GEOG 4017 [0.5] | Global Biogeochemical Cycles              |
| GEOG 4101 [0.5] | Two Million Years of Environmental Change |
| GEOG 4103 [0.5] | Water Resources Engineering               |
| GEOG 4104 [0.5] | Microclimatology                          |
| GEOG 4108 [0.5] | Permafrost                                |

#### Science Psychology Courses

|                 |  |
|-----------------|--|
| PSYC 2001 [0.5] | Introduction to Research Methods in Psychology |
| PSYC 2002 [0.5] | Introduction to Statistics in Psychology       |
| PSYC 2700 [0.5] | Introduction to Cognitive Psychology           |
| PSYC 3000 [1.0] | Design and Analysis in Psychological Research  |
| PSYC 3506 [0.5] | Cognitive Development                          |
| PSYC 3700 [1.0] | Cognition (Honours Seminar)                    |
| PSYC 3702 [0.5] | Perception                                     |
| PSYC 2307 [0.5] | Human Neuropsychology I                        |
| PSYC 3307 [0.5] | Human Neuropsychology II                       |

## Science Continuation Courses

A course at the 2000 level or above may be used as a Science Continuation credit in a B.Sc. program if it is not in the student's major discipline, and is chosen from the following:

BIOC (Biochemistry)

BIOL (Biology) Biochemistry students may use BIOL 2005 only as a free elective.

CHEM (Chemistry)

COMP (Computer Science) A maximum of two half-credits at the 1000-level in COMP, excluding COMP 1001 may be used as Science Continuation credits.

ERTH (Earth Sciences), except ERTH 2415 which may be used only as a free elective for any B.Sc. program. Students in Earth Sciences programs may use ERTH 2401, ERTH 2402, and ERTH 2403 only as free electives.

Engineering. Students wishing to register in Engineering courses must obtain the permission of the Faculty of Engineering and Design.

ENSC (Environmental Science)

FOOD (Food Science and Nutrition)

GEOM (Geomatics)

HLTH (Health Sciences)

ISAP (Interdisciplinary Science Practice)

MATH (Mathematics)

NEUR (Neuroscience)

PHYS (Physics), except PHYS 2903

Science Geography Courses (see list above)

Science Psychology Courses (see list above)

STAT (Statistics)

TSES (Technology, Society, Environment) except TSES 2305. Biology students may use these courses only as free electives. Integrated Science and Environmental Science students may include these courses in their programs but may not count them as part of the Science Sequence.

## Science Faculty Electives

Science Faculty Electives are courses at the 1000-4000 level chosen from:

BIOC (Biochemistry)

BIOL (Biology) Biology & Biochemistry students may use BIOL 1010 and BIOL 2005 only as free electives

CHEM (Chemistry) except CHEM 1003, CHEM 1004 and CHEM 1007

COMP (Computer Science) except COMP 1001

ERTH (Earth Sciences) except ERTH 1010, ERTH 1011 and ERTH 2415. Earth Sciences students may use ERTH 2401, ERTH 2402, and ERTH 2403 only as free electives.

Engineering

ENSC 2001

FOOD (Food Science and Nutrition)

GEOM (Geomatics)

HLTH (Health Science)

ISAP (Interdisciplinary Science Practice)

MATH (Mathematics)

NEUR (Neuroscience)

PHYS (Physics) except PHYS 1901, PHYS 1902, PHYS 1905, PHYS 2903

Science Geography (see list above)

Science Psychology (see list above)

STAT (Statistics)

TSES (Technology, Society, Environment) Biology students may use these courses only as free electives.

## Advanced Science Faculty Electives

Advanced Science Faculty Electives are courses at the 2000-4000 level chosen from the Science Faculty Electives list above.

## Approved Courses Outside the Faculties of Science and Engineering and Design (may include NSCI 1000)

All courses offered by the Faculty of Arts and Social Sciences, the Faculty of Public Affairs, and the Sprott School of Business are approved as Arts or Social Sciences courses EXCEPT FOR: All Science Geography courses (see list above), all Geomatics (GEOM) courses, all Science Psychology courses (see list above). NSCI 1000 may be used as an Approved Course Outside the Faculties of Science and Engineering and Design.

## Free Electives

Any course is allowable as a Free Elective providing it is not prohibited (see below). Students are expected to comply with prerequisite requirements and enrolment restrictions for all courses as published in this Calendar.

## Courses Allowable Only as Free Electives in any B.Sc. Program

|                 |   |
|-----------------|---|
| BIOL 4810 [0.5] | Education Research in Undergraduate Science |
| CHEM 1003 [0.5] | The Chemistry of Food, Health and Drugs     |
| CHEM 1004 [0.5] | Drugs and the Human Body                    |
| CHEM 1007 [0.5] | Chemistry of Art and Artifacts              |
| ERTH 1010 [0.5] | Our Dynamic Planet Earth                    |
| ERTH 1011 [0.5] | Evolution of the Earth                      |
| ERTH 2415 [0.5] | Natural Disasters                           |
| ISCI 1001 [0.5] | Introduction to the Environment             |
| ISCI 2000 [0.5] | Natural Laws                                |
| ISCI 2002 [0.5] | Human Impacts on the Environment            |
| MATH 0107 [0.5] | Algebra and Geometry                        |
| PHYS 1901 [0.5] | Planetary Astronomy                         |
| PHYS 1902 [0.5] | From our Star to the Cosmos                 |
| PHYS 1905 [0.5] | Physics Behind Everyday Life                |
| PHYS 2903 [0.5] | Physics Towards the Future                  |

## Prohibited Courses

The following courses are not acceptable for credit in any B.Sc. program:

|                 |   |
|-----------------|---|
| COMP 1001 [0.5] | Introduction to Computational Thinking for Arts and Social Science Students |
| MATH 0005 [0.5] | Precalculus: Functions and Graphs   |
| MATH 0006 [0.5] | Precalculus: Trigonometric Functions and Complex Numbers                    |
| MATH 1009 [0.5] | Mathematics for Business  |
| MATH 1119 [0.5] | Linear Algebra: with Applications to Business                               |

|                 |   |
|-----------------|---|
| MATH 1401 [0.5] | Elementary Mathematics for Economics I  |
| MATH 1402 [0.5] | Elementary Mathematics for Economics II |

## Co-operative Education

For more information about how to apply for the Co-op program and how the Co-op program works please visit the Co-op website.

All students participating in the Co-op program are governed by the Undergraduate Co-operative Education Policy.

## Undergraduate Co-operative Education Policy

### Admission Requirements

Students can apply to Co-op in one of two ways: directly from high school, or after beginning a degree program at Carleton.

If a student applies to a degree program with a Co-op option from high school, their university grades will be reviewed two terms to one year prior to their first work term to ensure they meet the academic requirements after their first or second year of study. The time at which the evaluation takes place depends on the program of study. Students will automatically receive an admission decision via their Carleton email account.

Students who did not request Co-op at the time they applied to Carleton can request Co-op after they begin their university studies. To view application instructions and deadlines, please visit [carleton.ca/co-op](http://carleton.ca/co-op).

To be admitted to Co-op, a student must successfully complete 5.0 or more credits that count towards their degree, meet the minimum CGPA requirement(s) for the student's Co-op option, and fulfil any specified course prerequisites. To see the unique admission and continuation requirements for each Co-op option, please refer to the specific degree programs listed in the Undergraduate Calendar.

### Participation Requirements

#### COOP 1000

Once a student has been given admission or continuation confirmation to the co-op option s/he must complete and pass COOP 1000 (a mandatory online 0.0 credit course). Students will have access to this course a minimum of two terms prior to their first work term and will be notified when to register.

#### Communication with the Co-op Office

Students must maintain contact with the co-op office during their job search and while on a work term. All email communication will be conducted via the students' Carleton email account.

#### Employment

Although every effort is made to ensure a sufficient number of job postings for all students enrolled in the co-op option of their degree program, no guarantee of employment can be made. Carleton's co-op program operates a competitive job search process and is dependent upon current market conditions. Academic

performance, skills, motivation, maturity, attitude and potential will determine whether a student is offered a job. It is the student's responsibility to actively conduct a job search in addition to participation in the job search process operated by the co-op office. Once a student accepts a co-op job offer (verbally or written), his/her job search will end and access to co-op jobs will be removed for that term. Students that do not successfully obtain a co-op work term are expected to continue with their academic studies. The summer term is the exception to this rule. Students should also note that hiring priority is given to Canadian citizens for co-op positions in the Federal Government of Canada.

#### Registering in Co-op Courses

Students will be registered in a Co-op Work Term course while at work. The number of Co-op Work Term courses that a student is registered in is dependent upon the number of four-month work terms that a student accepts.

While on a co-op work term students may take a maximum of 0.5 credit throughout each four-month co-op work term. Courses must be scheduled outside of regular working hours.

Students must be registered as full-time before they begin their co-op job search. All co-op work terms must be completed before the beginning of the final academic term. Students may not finish their degree on a co-op work term.

#### Work Term Assessment and Evaluation

To obtain a Satisfactory grade for the co-op work term students must have:

1. A satisfactory work term evaluation by the co-op employer;
2. A satisfactory grade on the work term report.

Students must submit a work term report at the completion of each four-month work term. Reports are due on the 16th of April, August, and December and students are notified of due dates through their Carleton email account.

Workplace performance will be assessed by the workplace supervisor. Should a student receive an unsatisfactory rating from their co-op employer, an investigation by the co-op program manager will be undertaken. An unsatisfactory employer evaluation does not preclude a student from achieving an overall satisfactory rating for the work term.

#### Graduation with the Co-op Designation

In order to graduate with the co-op designation, students must satisfy all requirements for their degree program in addition to the requirements according to each co-op program (i.e. successful completion of three or four work terms).

Note: Participation in the co-op option will add up to one additional year for a student to complete their degree program.

#### Voluntary Withdrawal from the Co-op Option

Students may withdraw from the co-op option of their degree program during a study term ONLY. Students at work may not withdraw from the work term or the co-op

option until s/he has completed the requirements of the work term.

Students are eligible to continue in their regular academic program provided that they meet the academic standards required for continuation.

### **Involuntary or Required Withdrawal from the Co-op Option**

Students may be required to withdraw from the co-op option of their degree program for one or any of the following reasons:

1. Failure to achieve a grade of SAT in COOP 1000
2. Failure to pay all co-op related fees
3. Failure to actively participate in the job search process
4. Failure to attend all interviews for positions to which the student has applied
5. Declining more than one job offer during the job search process
6. Continuing a job search after accepting a co-op position
7. Dismissal from a work term by the co-op employer
8. Leaving a work term without approval by the Co-op manager
9. Receipt of an unsatisfactory work term evaluation
10. Submission of an unsatisfactory work term report

### **Standing and Appeals**

The Co-op and Career Services office administers the regulations and procedures that are applicable to all co-op program options. All instances of a student's failure during a work term or other issues directly related to their participation in the co-op option will be reported to the academic department.

Any decision made by the Co-op and Career Services office can be appealed via the normal appeal process within the University.

### **International Students**

All International Students are required to possess a Co-op Work Permit issued by Immigration, Refugees and Citizenship Canada before they can begin working. It is illegal to work in Canada without the proper authorization. Students will be provided with a letter of support to accompany their application. Students must submit their application for their permit before being permitted to view and apply for jobs on the Co-op Services database. Confirmation of a position will not be approved until a student can confirm they have received their permit. Students are advised to discuss the application process and requirements with the International Student Services Office.

### **B.Sc. Honours Biotechnology: Co-op Admission and Continuation Requirements**

- Maintain full-time status in each study term;
- Be eligible to work in Canada (for off-campus work);
- Have successfully completed COOP 1000 .

### **Co-operative Education - Bachelor of Science**

The following programs in the Bachelor of Science Honours offer a co-operative education option:

Applied Physics, Biochemistry (including computational), Bioinformatics, Biology (including computational), Biotechnology, Chemistry (including computational), Earth Sciences, Environmental Science, Food Science and Nutrition, Geomatics, Neuroscience, Neuroscience and Mental Health, Physical Geography and Physics.

Students in all streams of the Bachelor of Science must successfully complete three (3) work terms to obtain the co-op designation.

### **Co-op Admission and Continuation Requirements for Students in the Bachelor of Science**

For admission to and continuation in the co-op option, all students must:

- Maintain full-time status in each study term (2.0 credits);
- Be eligible to work in Canada (for off-campus work)
- Have successfully completed COOP 1000

### **Program-Specific Admission and Continuation Requirements:**

**Applied Physics, Biochemistry (including computational), Bioinformatics, Biology (including computational), Biotechnology, Chemistry (including computational), Earth Sciences, Environmental Science, Neuroscience, Neuroscience and Mental Health and Physics:**

1. Completion of 5.0 or more credits at Carleton University;
2. Registered as a full-time student in the Bachelor of Science Honours degree program;
3. Obtained and maintained a major CGPA of 8.0 or higher and an overall CGPA of 6.50 or higher

### **Food Science and Nutrition**

1. Registered as a full-time student in the Bachelor of Science Honours in Food Science and Nutrition;
2. Obtained and maintained a major CGPA of 9.0 or higher and an overall CGPA of 7.5 or higher in the first three years of academic study
3. Have obtained third-year standing;
4. Successfully completed, by the start date of the first work term, at least 2.0 credits from the following list of courses: FOOD 3001, FOOD 3002, FOOD 3003, FOOD 3004, and FOOD 3005

### **Geomatics and Physical Geography:**

1. Registered in the Bachelor of Science (Honours) Programs in Physical Geography or Geomatics;
2. Obtained and maintained an overall minimum CGPA of 9.5 and a major CGPA of 9.5;
3. Have obtained third-year standing;
4. Successfully completed, by the start-date of the first work term:

- a. the required second-year methods courses in their program (GEOG/ENST 2005, GEOG/ENST 2006)
  - b. the required field course in their program (ENST 3900/GEOG 3000/GEOG 3010/GEOG 3030)
5. Be registered as a full-time student.

### Co-op Work Term Courses

#### Physics, Applied Physics, Biology and Physics, Chemistry and Physics, Mathematics and Physics

PHYS 3999 [0.0] Co-operative Work Term Report

#### Biochemistry and Computational Biochemistry

BIOC 3999 [0.0] Co-operative Work Term

#### Biochemistry and Biotechnology, Bioinformatics, Biology, Biotechnology, Computational Biology, Biology and Physics

BIOL 3999 [0.0] Co-operative Work Term Report

#### Chemistry, Chemistry and Physics, Computational Chemistry

CHEM 3999 [0.0] Co-operative Work Term

#### Earth Sciences

ERTH 3999 [0.0] Co-operative Work Term

#### Food Science

FOOD 3999 [0.0] Co-operative Work Term

#### Environmental Science

ENSC 3999 [0.0] Co-operative Work Term

#### Geomatics

GEOG 3999 [0.0] Co-operative Work Term

#### Neuroscience and Neuroscience Mental Health

NEUR 3999 [0.0] Co-operative Work Term

#### Physical Geography

GEOG 3999 [0.0] Co-operative Work Term

### Work-Study Patterns

#### Applied Physics, Biochemistry, Bioinformatics, Biology, Biotechnology, Chemistry, Computational Biochemistry, Computational Biology, Computational Chemistry, Earth Sciences, Environmental Science, Neuroscience, Neuroscience and Mental Health, Physics

| Year 1 |         | Year 2 |         | Year 3 |         | Year 4 |         | Year 5 |         |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| Term   | Pattern | Term   | Pattern | Term   | Pattern | Term   | Pattern | Term   | Pattern |
| Fall   | S       | Fall   | S       | Fall   | S       | Fall   | *W/S    | Fall   | S       |
| Winter | S       | Winter | S       | Winter | S       | Winter | *W/S    | Winter | S       |
| Summer | **O/W   | Summer | *W      | Summer | O/W     | Summer | O/W     |        |         |

#### Food Science and Nutrition

| Year 1 |         | Year 2 |         | Year 3 |         | Year 4 |         | Year 5 |         |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| Term   | Pattern | Term   | Pattern | Term   | Pattern | Term   | Pattern | Term   | Pattern |
| Fall   |         | Fall   | S       | Fall   | S       | Fall   | W/S     | Fall   | S       |
| Winter |         | Winter | S       | Winter | S       | Winter | W/S     | Winter | S       |
| Summer |         | Summer |         | Summer | O/W     | Summer | O/W     |        |         |

#### Physical Geography, Geomatics

| Year 1 |         | Year 2 |         | Year 3 |         | Year 4 |         | Year 5 |         |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| Term   | Pattern | Term   | Pattern | Term   | Pattern | Term   | Pattern | Term   | Pattern |
| Fall   | S       | Fall   | S       | Fall   | S       | Fall   | S/W     | Fall   | O       |
| Winter | S       | Winter | S       | Winter | S       | Winter | S/W     | Winter | S       |
| Summer |         | Summer |         | Summer | W       | Summer | S/W     |        |         |

#### Legend

S: Study

W: Work

### Admissions Information

Admission Requirements are for the 2024-25 year only, and are based on the Ontario High School System. Holding the minimum admission requirements only establishes eligibility for consideration. The cut-off averages for admission may be considerably higher than the minimum. See also the **General Admission and Procedures** section of this Calendar. An overall average of at least 70% is normally required to be considered for admission. Some programs may also require specific course prerequisites and prerequisite averages and/or supplementary admission portfolios. Higher averages are required for admission to programs for which the demand for places by qualified applicants exceeds the number of places available. The overall average required for admission is determined each year on a program by program basis. Consult [admissions.carleton.ca](http://admissions.carleton.ca) for further details.

Note: Courses listed as *recommended* are not mandatory for admission. Students who do not follow the recommendations will not be disadvantaged in the admission process.

### Admissions Information

Admission requirements are based on the Ontario High School System. Prospective students can view the admission requirements through the Admissions website at [admissions.carleton.ca](http://admissions.carleton.ca). The overall average required for admission is determined each year on a program-by-program basis. Holding the minimum admission requirements only establishes eligibility for admission to programs for which the demand for places by qualified applicants exceeds the number of places available. All programs have limited enrolment and admission is not guaranteed. Some programs may also require specific course prerequisites and prerequisite averages and/or supplementary admission portfolios. Consult [admissions.carleton.ca](http://admissions.carleton.ca) for further details.

**Note:** If a course is listed as recommended, it is not mandatory for admission. Students who do not follow the recommendations will not be disadvantaged in the admission process.

### Degrees

- B.Sc. (Honours)
- B.Sc. (Major)
- B.Sc.

### Admission Requirements

#### B. Sc. Honours

##### First Year

The Ontario Secondary School Diploma (OSSD) or equivalent including a minimum of six 4U or M courses. For most programs including Biochemistry, Bioinformatics, Biotechnology, Chemistry, Combined Honours in Biology and Physics, Chemistry and Physics, Computational Biochemistry, Food Science, Nanoscience, Neuroscience and Biology, Neuroscience and Mental Health, and Psychology, the six 4U or M courses must include

Advanced Functions, and two of Biology, Chemistry, Earth and Space Sciences, or Physics. (Calculus and Vectors is strongly recommended).

#### **Specific Honours Admission Requirements**

For the Honours programs in Earth Sciences, Environmental Science, Geomatics, Interdisciplinary Science and Practice, and Physical Geography, Calculus and Vectors may be substituted for Advanced Functions.

For the Honours programs in Physics and Applied Physics, and for double Honours in Mathematics and Physics, Calculus and Vectors is required in addition to Advanced Functions and one of 4U Physics, Chemistry, Biology, or Earth and Space Sciences. For all programs in Physics, 4U Physics is strongly recommended.

For Honours in Psychology, a 4U course in English is recommended.

For Honours in Environmental Science, a 4U course in Biology and Chemistry is recommended.

#### **Advanced Standing**

Applications for admission beyond first year will be assessed on their merits. Applicants must normally be *Eligible to Continue* in their year level, in addition to meeting the CGPA thresholds described in Section 3.1.9 of the Academic Regulations of the University. Advanced standing will be granted only for those subjects deemed appropriate for the program and stream selected.

#### **B.Sc. Major and B.Sc.**

##### **First Year**

The Ontario Secondary School Diploma (OSSD) or equivalent including a minimum of six 4U or M courses. The six 4U or M courses must include Advanced Functions and two of Calculus and Vectors, Biology, Chemistry, Earth and Space Science, or Physics (Calculus and Vectors is strongly recommended). For the B.Sc. Major in Physics, 4U Physics is strongly recommended.

##### **Advanced Standing**

Applications for admission beyond first year will be assessed on their merits. Applicants must normally be *Eligible to Continue* (EC) in their year level. Advanced standing will be granted only for those subjects deemed appropriate for the program and stream selected.

##### **Co-op Option**

##### **Direct Admission to the First Year of the Co-op Option**

Applicants must:

1. meet the required overall admission cut-off average and prerequisite course average. These averages may be higher than the stated minimum requirements;
2. be registered as a full-time student in the Bachelor of Science Honours program;
3. be eligible to work in Canada (for off-campus work placements).

Note that meeting the above requirements only establishes eligibility for admission to the program. The prevailing job market may limit enrolment in the co-op option.

**Note:** continuation requirements for students previously admitted to the co-op option and admission requirements for the co-op option after beginning the program are described in the Co-operative Education Regulations section of this Calendar.